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Instrumental and Bioassay Analysis of PCDD/Fs and Dioxin-Like PCBs in Sediments and Floodplain soils of the Saginaw and Shiawassee River Watershed, Michigan

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Polychlorinated dibenzo-p-dioxins (PCDDs), dibenzofurans (PCDFs), and coplanar PCBs were analyzed in floodplain soils, sediments, and sediment core samples collected along the Saginaw Bay (SB), Saginaw River (SR), and Shiawassee River (SSR).

For the SSR samples, mean concentrations of PCBs was 362 ng/g dw in floodplain soils, and 80 ng/g dw in surface sediments. For the SR samples, mean concentrations of PCBs was 90 ng/g dw in soil and was 86 ng/g dw in sediments. For the SB samples, mean concentration of PCBs was 22 ng/g dw in soil and 67 ng/g dw in sediments. PCB congener profile, in general, was in the order 4CB>3CB>5CB.

For the SSR samples, mean concentration of PCDD/DFs was 0.37 ng/g dw in soil and 0.10 ng/g dw in sediments. Mean concentration of coplanar PCBs was 0.71 ng/g dw in soil and 0.20 ng/g dw in sediment. Profiles of PCDD/DFs and coplanar PCBs showed similar compositions, but different concentrations between soils and sediments. For the SR samples, mean concentration of PCDD/DFs was 0.50 ng/g dw in soil and 4.83 ng/g dw in sediments and of coplanar PCBs were 0.23 ng/g dw in soil and 0.18 ng/g dw in sediment. Finally, for the SB, mean concentration of PCDD/DFs was 0.28 ng/g dw in soil and 4.34 ng/g dw in sediments and of coplanar PCBs was 0.16 ng/g dw in soil and 0.32 ng/g dw in sediments.

Mass balance analysis of TCDD equivalents (TCDD-EQ) derived from H4IIE bioassay of sediment extracts and 2,3,7,8-tetrachlordibenzo-p-dioxin equivalents (TEQs) calculated from instrumental analysis suggested that PCDD/DFs and coplanar PCBs were the major contributors to TEQs in sediments of the Saginaw River.